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# **INITIAL SITE RESPONSE PLAN**

## **BROOKHAVEN NATIONAL LABORATORY**





**BROOKHAVEN NATIONAL LABORATORY  
MANAGEMENT RESPONSE PLAN  
FOR THE  
CHEMICAL SAFETY VULNERABILITY FIELD ASSESSMENT**

**Introduction**

As part of the U.S. Department of Energy's (DOE) initiative to identify chemical safety vulnerabilities throughout the DOE complex, the Chemical Safety Vulnerability Core Working Group conducted a series of field assessments at various DOE contractor sites. Brookhaven National Laboratory (BNL) was subjected to a field verification on May 16-23, 1994. The draft field verification visit assessment report identifies four issues at Brookhaven that should be considered as part of the subsequent effort to identify DOE-wide chemical vulnerabilities. None of the conditions or circumstances identified required immediate action to prevent severe consequences. However, all four vulnerabilities were characterized as of short-term consequence, with severity ranging from medium to high. Many of the observations supporting the vulnerabilities had been identified through Brookhaven's Self-Assessment Program or, previously, through external appraisals, and were being addressed.

This Management Response Plan addresses the vulnerabilities identified in the draft assessment report. Brookhaven discussion is provided for each observation supporting BNL response to the vulnerabilities, and any action taken or planned. BNL recognizes that correcting the observation without addressing the root cause will not meet the objective of the chemical safety vulnerability initiative. Consequently, the responses focus on efforts and activities that will address the broader programmatic issues associated with the vulnerabilities.

**Response Summary**

None of the four vulnerabilities was characterized as of immediate consequence. This fact is important because it allows the Laboratory the opportunity to prioritize the issues through our environment, safety, and health (ESH) Management System and address them in the Laboratory's ESH Management Plan with ESH issues that have been previously identified and prioritized. As such, the BNL's appropriate ADS is referenced, and the current status discussed.

Brookhaven National Laboratory has set a goal of ESH excellence supported by a culture of continuous improvement. To meet this goal, the Laboratory has been evolving an integrated approach to the management of ESH at the site. The Draft Chemical Vulnerability Assessment of BNL identified vulnerabilities at the Laboratory which represent another perspective on the systems approach that the Laboratory is pursuing. The vulnerabilities can be categorized as weaknesses in *planning, protracted implementation of ESH programs, and resource limitations*. The Laboratory has already recognized these as issues which apply to the overall ESH program at BNL and has been working diligently to improve planning, to assure that those aspects of the ESH program which require longer implementation times represent low risk areas, and to apply available resources in an efficient and cost-effective manner.

One of the key aspects of the Laboratory's integrated approach for ESH management is the analysis, prioritization, and planned actions to respond to identified deficiencies or new initiatives and requirements. It is BNL's goal to balance relative risk against available resources and mission requirements. Based on the many favorable DOE evaluations of BNL's performance, the Laboratory is confident of its ability to work with Brookhaven Area Office (BHO), Chicago Operations Office (CH), the Office of Energy Research (ER), and Laboratory Management (LM) to address and resolve

the specific issues raised by the Team. There are, however, barriers within the DOE system which hamper the Laboratory's ability to fully address these vulnerabilities in a consistent and integrated fashion. These barriers are:

- Conflicting and sometimes redundant or excessive requirements,
- Conflicting priorities,
- DOE initiatives to decrease/control site support functions.

BNL is a multipurpose laboratory with its major mission involving basic research with large research facilities (reactors and accelerators). Brookhaven has no large production or pilot plant activities which involve large quantities of chemicals. The Laboratory's SARA Title III report lists only 5 substances above the Threshold Planning Quantities (TPQ). BNL research and operations use a large number of different chemicals in small quantities, primarily in laboratories with hoods. Potential chemical vulnerabilities are risk ranked and prioritized for resolution with other ESH issues. The following specific responses and improvements are consistent with this policy.

**CHEMICAL SAFETY VULNERABILITY REVIEW**  
**September 1994**

**Site/Facility: Brookhaven National Laboratory**  
**Point of Contact: Otto White (516-282-4248)**

**Vulnerability Number: CSVN-BNL-000-01**

**Vulnerability:**

- Weaknesses in planning impede the effective elimination of hazards posed to workers and members of the public.

**Summary of Vulnerability:**

- Weaknesses in planning are evident in the site maintenance program, facility/process construction and design, management of chemicals, and packaging of waste materials. Maintenance programs at existing facilities are not effective in preventing facility deterioration in order to prevent loss of chemicals from systems. Relatively new system designs have not incorporated engineered controls to prevent chemical exposures. Several older facilities are used for storage of hazardous materials. These facilities do not have all the safety systems common to general industry. Site chemical inventories are incomplete and do not provide the detail needed to plan appropriately for procurement, use, storage, and disposal of hazardous chemicals. Immature and incomplete programs fail to mitigate chemical release incidents to workers or the environment.

**Response:**

- Several sitewide committees have been charged with advising management on chemical safety issues. These committees include the Chemical Process Safety Committee, Chemical Management Program Advisory Committee, Chlorine Review Committee, and Ad Hoc Committee on Chemical Safety. The products of these committees will be used to obtain sitewide buyin and ownership of recommendations.

BNL has initiated a number of projects which are designed to improve the management of chemicals. Currently individual departments and divisions are maintaining detailed inventories of chemicals within their facilities while on a sitewide basis, an inventory for SARA Title III requirements and Community Right-to-Know regulations is being maintained using a 5 pound - 1 gallon criteria. As a DOE Occupational Safety & Health Worker Protection Program (OSHWPP) pilot site recipient, BNL is currently installing a chemical management system (CMS) that was developed at PNL. This program will provide an online chemical management database that includes a detailed chemical inventory on a room-to-room basis. The system, via bar-coding chemical containers, will track chemicals from their initial entry onsite to disposal. Features of the system include:

- Chemical Exchange Program
- Detailed Inventories
- Hazard Analysis
- Emergency Response Information

- Identification of Waste Stream
- Minimization of Waste
- Generates Regulatory Report

ADS E94D0003 in the BNL ESH Management Plan will address the initial inventory.

Operational policies developed for the use of the CMS will specify requirements for inventories at various organizational levels including laboratories.

Currently ESH Standards 2.1.1 and 6.2.0 provide guidance on the use, storage and disposal of chemicals. These standards will be reissued as appropriate.

- Older buildings used for storage of hazardous materials

BNL has recognized the need to improve the facilities where hazardous waste is repackaged and temporarily stored for offsite disposal. A new facility is to be constructed within the next two years. The new facility will provide BNL with the capability to meet its hazardous, mixed, and radioactive waste management requirements well into the next century. It is designed to permit safe sampling, handling, repackaging, and temporary storage of waste prior to shipment offsite. It is also designed to allow for future expansion to meet foreseeable BNL mission needs. Funding for this facility has been approved by EM-30.

- Although the maintenance budgets have been decreasing, the dedication of effort towards preventive and predictive maintenance activities has increased during that same period. The inoperable safety shower observed by the site review team is clearly a preventive maintenance issue. Further investigation would have revealed that an extensive, formal safety shower and eye wash station inspection program exists. This observation by the team was an isolated problem. There is no direct correlation of the preventive maintenance budget to facility condition.
- Regarding piping systems and pressure vessels, BNL is fully on line with the Condition Assessment Survey program as mandated by DOE. Part of that inspection process requires that all pressure vessels/piping systems be visually inspected for signs of deterioration. When evidence of deterioration is found, the program calls for nondestructive testing of vessels and pipes. These inspections are scheduled through the Preventive Maintenance Module of our Computerized Maintenance Management System. BNL recently sent preventive maintenance coordinators to a DOE-sponsored Predictive Maintenance Seminar and found that the Laboratory's program is very consistent with most other similar multiprogram labs. The Laboratory acknowledges the benefits of predictive maintenance and it is a cornerstone of our maintenance philosophy.
- Maintenance Implementation Plans (MIP) are required for nuclear facilities. Those facilities which were identified prior to FY 1994 have developed and submitted MIPs to DOE for approval. The two facilities identified as nonreactor nuclear facilities in FY 1994, which includes the Hazardous Waste Management Facility, have commitment dates for submitting MIPs to DOE.

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**September 1994**

**Site/Facility:** Brookhaven National Laboratory  
**Point of Contact:** Otto White (516-282-4248)

**Vulnerability Number:** CSVN-BNL-000-02

**Vulnerability:**

- Protracted implementation of core safety programs increases the potential for chemical vulnerabilities.

**Summary of Vulnerability:**

- The three means for managing hazardous chemicals are: (1) a knowledgeable and well-directed operating organization; (2) technically capable advocates for ES&H, who can provide specialized assistance to line organizations; and (3) an array of core or model safety programs to guide both groups. The core safety programs at the BNL have not been fully implemented, and completing such programs, including training, is not scheduled for several years.

Implementation of elements of core safety programs that could lead to chemical safety vulnerabilities is protracted in several areas including: (1) incomplete hazards assessment to support emergency management, (2) incomplete ES&H training, and (3) a lack of guidance concerning chemical inventory in the ES&H Standards for Hazard Communication and the Laboratory Chemical Hygiene Plan.

**Response:**

- The Laboratory has prepared and issued a request for proposal to perform Hazard Assessments at BNL facilities. These facilities have previously been identified and prioritized and are included in the ESH Management Plan (ADS A92D0019, B94D0013). A total of 23 facilities containing 36 buildings are included in the project. These assessments will be conducted in accordance with DOE 5500.3A and organized to meet the DOE Emergency Management Requirements.

Each assessment document will be formatted to contain the following elements:

- Introduction
- Facility and Process Description
- Identification and Screening of Hazards
- Hazard Characterization
- Event Scenarios
- Event Consequences
- Emergency Planning Zone
- Emergency Classes, Protective Actions and Emergency Action Levels
- Maintenance and Review of the Hazard Assessment Documents

- BNL's chemical vulnerability with respect to chlorine is being addressed. The Laboratory decision to reduce the chlorine gas inventory at all locations below the OSHA Chemical Process Safety Standard's threshold quantities was a recommendation from the ad hoc committee appointed to evaluate the applicability of the OSHA Standard to processes and activities at BNL. Subsequently, another committee (Chlorine Review Committee) has been established to study the use of chlorine in compressed gas cylinders and alternatives that may be viable at BNL.
- Although the Chlorine Review Committee has not yet completed its deliberations, its initial recommendations will result in an improved margin of safety. To date, the committee conducted an independent sitewide review using an outside technical specialist, made and implemented inventory reduction measures, and initiated system changes to convert pressurized delivery systems to vacuum delivery systems. There are other chlorine sources, such as HTH tablets or sodium hypochlorite solutions, that are under consideration as replacements for gaseous chlorine use in some areas. Many of these lower risk systems have already been implemented. The applicability of similar solutions at remaining locations using chlorine in gas cylinders is the specific charge of the committee.

Hazard identification will include a review of chemicals to determine threshold planning quantities (TPQ) as defined by SARA Title III, 40 of the Code of Federal Regulations (CFR), Part 355, Appendix A, radioactive material quantities listed in 10CFR30.72 schedule C and chemically toxic materials which, based on their toxicological and physical properties, present potential hazards.

Facilities and process description will provide sufficient detail to support the identification and characterization of all hazards and determine their potential onsite and offsite consequences. The facility descriptions will address general information related to the facility's mission, operations, and physical characteristics, including an assessment of the facility's vulnerability to external and natural phenomena hazards. Facility descriptions will include the location of the facility relative to other facilities on the same site, the site boundaries, the nearest public access locations, and transportation networks, such as highways, railways and waterways. If appropriate, the facility description will include the types of materials transported, the types of containers and vehicles used, the routes, speeds, number of shipments per year, and other controls relevant to the likelihood or severity of an accident.

BNL has recognized, prior to the chemical safety vulnerabilities site visit, deficiencies in compliance training in the S&EP Training Plan. The Plan covers industrial hygiene, industrial safety, radiological protection and general employee training requirements mandated by DOE, OSHA, ANSI, etc. Deficiencies have been prioritized in the planning, and ADSs A93D0195 and E94D0031 have been prepared to define funding, human resources, and facility requirements. Internal and external sources have been targeted to facilitate improvements.

Guidance concerning chemical inventories has been addressed in the response to CSVR-BNL-000-01.

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**September 1994**

**Site/Facility:** Brookhaven National Laboratory  
**Point of Contact:** Otto White (516-282-4248)

**Vulnerability Number:** CSVN-BNL-000-03

**Vulnerability:**

- There is a point at which shortfalls in resources will lead to new chemical safety vulnerabilities, as well as an inability to accomplish timely progress on identified issues.

**Summary of Vulnerability:**

- The Safety and Environmental Protection Division provides technical expertise to line programs, as well as supporting independent reviews of self-assessments by various operating organizations. A declining laboratory budget, combined with a fairly rigid control over General and Administrative expenses (which is where most costs of the Safety and Environmental Division are funded) means that BNL is entering a period where there may be real decreases in resources applied to ES&H. Budget constraints will lead to a deterioration in the capabilities to provide technical support necessary to carry out mandated ES&H programs. The relatively low number of staff at BNL that are well qualified in recognizing and providing solutions to chemical safety vulnerabilities can be expected to further decrease with time.

**Response:**

- BNL has and will continue to take steps to assure that resource limitations do not impair the safety and health of workers and the public or our commitment to protect the environment. BNL has been evolving an integrated approach to the management of ESH at the site. The Laboratory has been working diligently to improve planning, to assure that those aspects of the overall ESH program which require longer implementation times represent low risk areas and to apply resources in an efficient and cost-effective manner. In the preparation of this ESH Management Plan, BNL will prioritize vulnerabilities for inclusion in annual budget submittals.

A key aspect of BNL's integrated approach for the ESH Management Plan is the analysis, prioritization, and planned response to identified deficiencies or new initiatives/requirements. It is the Laboratory's goal to balance relative risk against available resources and mission requirements. The definition, integration, and prioritization of requirements establish a baseline from which an integrated plan of activities, schedules, and costs can be developed to clearly define a path for ESH programs. Sites not only have to deal with chemical safety, but must assure the stability of their programs with respect to all ESH requirements. Sites must also address priorities in other support areas, such as physical plant needs. Integration of activities and tradeoffs in conflicting priorities are a fact that sites deal with every day. Not every requirement is a priority 1, and sites such as BNL attempt to consistently balance the demands of site operations with respect to all ESH disciplines as well as between ESH demands and other non-ESH requirements.

While limited resources are an issue in meeting all demands, they represent a challenge for efficient and cost-effective compliance and improvements. Flat or decreasing budgets do not necessarily imply inadequate levels of safety or a reduction of the core program activities. However, limited resources require a clear agreement between DOE and the sites on requirements and their priority so that resources can be more effectively used to reach realistic goals.

Planning weaknesses result from not defining an appropriate set of integrated requirements with priorities that include cross-cutting activities. For sites such as BNL, where the mission has remained fairly constant and is expected to continue so in the future, the issues center on maintaining and upgrading existing facilities, operations, and programs to maintain our ESH progress. The issue is to assure the stability and integrity of all facilities in all ESH areas; therefore, a clear definition of requirements, a setting of priorities and goals, planning, and integration of activities to implement those plans can strengthen the ESH status of the site.

The Laboratory will continue the development and implementation of this integrated approach for managing ESH. The Laboratory will continue to work with BHO, CH and ER to develop long-range requirements, establish realistic goals and assure the stability of our total ESH program. There are already mechanisms in place to achieve this, and we recommend enhancements to these activities:

1. The effort to revise the DOE Directives System should include an effort to prioritize and cross-link requirements. As the Laboratory, in conjunction with CH/LM and ER, continues to confront the reality of resource-constrained budgets, the need for DOE leadership to set policy on priorities and integration of requirements becomes more and more critical.
2. A second aspect of the Directive System improvements requires that the authors perform a resource impact analysis and that DOE integrate the incremental impact in its own internal budget process. Currently, ER and the Laboratory are repeatedly tasked to implement new requirements without additional resources or to reduce program activities in order to meet new requirements that have not been fully reviewed. At a time when DOE is focusing on reductions in overhead costs, this approach is incompatible. Review and cost impact analyses must, therefore, become institutionalized.
3. DOE has initiated several system approaches to handling ESH as well as non-ESH requirements. The ESH Management Plan is a good start for defining priorities and for resource allocation. It needs to mature, to become a long-range planning effort that helps DOE and the sites establish the path to excellence. The Capital Asset Management Process will be a valuable long-range management tool for DOE and the laboratories in the joint effort to more effectively plan and execute the maintenance and facilities management function; however, currently its implementation is placing a heavy burden on the laboratories. LM had been an advocate for direct funding CAMP startup costs for the laboratories. Support for this from other offices within DOE would help foster further development and implementation.

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**September 1994**

**Site/Facility:** Brookhaven National Laboratory  
**Point of Contact:** Otto White (516-282-4248)

**Vulnerability Number:** CSVN-BNL-000-04

**Vulnerability:**

- Formal control measures have not been implemented to ensure that personnel who do not read or speak English understand the safety requirements and hazards associated with work in hazardous environments.

**Summary of Vulnerability:**

- The requirement for contract specifications to provide positive assurance that subcontractor personnel who do not read or speak English understand workplace safety requirements and hazards has not been institutionalized. On an individual basis, specifications for subcontracts have, at the request of a safety engineer, included a clause stating "Workers shall be able to comprehend work and safety instructions in English or a supervisor who can translate shall be provided and be present at all times." On several occasions, a safety engineer has suspended work on a job site by invoking the contract clause that requires a bilingual person be present on the work site at all times.

**Response:**

All asbestos abatement contracts currently include the statement, "Workers shall be able to comprehend work and safety instructions in English or a supervisor who can translate shall be provided." The contract specification for all types of projects shall be updated to include the following verbiage under Supplementary Conditions- Construction Safety:

"Workers shall be able to comprehend the scope of work and safety instructions required to perform the job. If workers cannot read or speak English or are hearing impaired, an interpreter shall be provided by the contractor to ensure that the scope of work; information regarding hazards associated with the work-site; and safety requirements are relayed to them in a manner in which they can understand. The interpreter shall be at the work-site whenever these workers are on the job."

### NOTEWORTHY PRACTICES

- There were observed noteworthy practices, including an effective and simple system for controlling work by plant maintenance, an individual initiative to include a non-English speaking/reading clause in contracts, and the specific inclusion of chemicals in the safety analysis for the new Hazardous Waste Management facility. These will be considered, together with good practices at other sites, in developing the final report of the review of DOE operations.
- This facility has its own configuration management system, an effective computerized preventive maintenance control scheme for experimental equipment and safety-related systems, and a captive operating staff. The safety analysis document used as a Basis for Interim Operation addresses the requirements in DOE 5480.25, "Safety of Accelerator Facilities," and has been submitted to the Brookhaven Area Office for approval. The equipment has been maintained in good operating condition (the facility has been in operation for almost 25 years), procedures are in place, operating logs are kept, and it is apparent that the management and operating personnel in this area take pride in the safety and quality record that they have achieved. There were no conditions identified in this facility which would lead to a chemical vulnerability.
- The efforts of one construction safety engineer to address the issue of safety and hazard awareness for subcontractor personnel who do not read or speak English was identified as a noteworthy practice.

## INITIAL SITE RESPONSE PLAN SUMMARY

SITE	IMPROVEMENT	PRODUCT	DUE
Brookhaven National Laboratory	To improve weaknesses in planning that impede the effective elimination of hazards posed to workers and members of the public (CSVR-BNL-000-01), BNL reviewed its use of chlorine and identified improvements; obtained, via OSHWPP, a DOE proven Chemical Management System for sitewide implementation; and established a sitewide committee to review and advise on chemical safety issues.	Establish Chemical Management System Advisory Committee	Done
		Establish Chlorine Review Committee	Done
		Form and charge Ad Hoc Committee on Chemical Safety	Done
		Develop and initiate Chemical Management System	3/95
		Develop implementation plan for recommendations from the Chlorine Review Committee	11/94
	To minimize protracted implementation of core safety programs that may increase the potential for chemical vulnerabilities (CSVR-BNL-000-02), BNL has prepared and released a Request for Proposals to perform Hazard Assessment for up to 23 facilities and submitted request for funding ES&H Training in the Laboratory ES&H Management Plan.	Complete construction of new Hazardous Waste Management Facility	9/96
		Complete MIPs for all nuclear facilities onsite	2/95
		Complete hazard assessment for designated facilities	9/95
		Initiate improved OSHA training program	1/95

# INITIAL SITE RESPONSE PLAN SUMMARY

SITE	IMPROVEMENT	PRODUCT	DUE
Brookhaven National Laboratory	Improve ESH Management System to ensure that shortfalls in resources will not lead to significant ESH vulnerabilities (CSVR-BNL-000-03).	Develop and implement an ESH Management System Procedure to require annual review and prioritization of new vulnerabilities and requirements and incorporate them with the ESH Management Plan.	3/95
	Improve formal control measures to ensure that personnel who do not read or speak English understand the safety requirements and hazards associated with work in hazardous environments (CSVR-BNL-000-04).	Update contract specifications for all types of projects to include verbiage for safety control measures for personnel who do not speak English.	11/94

### **NOTEWORTHY PRACTICES**

Tandem Van de Graaff has its own configuration management system, an effective computerized preventive maintenance control scheme for experimental equipment and safety-related systems, and a stable operating staff. The safety analysis document used as a Basis for Interim Operation addresses the requirements in DOE 5480.25, "Safety of Accelerator Facilities," and has been submitted to the Brookhaven Area Office for approval.